

Key to Genera of Mymaridae in the Hawaiian Islands, with Notes on Some of the Species (Hymenoptera: Chalcidoidea)

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Abstract. A key to 17 genera of Mymaridae that have been found in the Hawaiian Islands is presented. Notes on material examined and, where needed, keys to species are provided, except for the three largest genera: *Anagrus* Haliday, *Gonatocerus* Nees and *Polynema* Haliday, which will be treated in other papers. The remaining genera, which include 28 known species in Hawaii, are as follows: *Acmopolynema* Ogloblin, *Anaphes* Haliday, *Chaetomymar* Ogloblin, *Cleruchus* Enock, *Dicopus* Enock, *Mymar* Westwood, *Ooconus* Haliday, *Schizophragma* Ogloblin, *Stephanodes* Enock and an apparently undescribed genus (one species each); *Stethynium* Enock (two species); *Camptoptera* Förster (three species); *Erythmelus* Enock (four species) and *Alaptus* Westwood (nine species). The new genus is recorded here, but is being formally described in another paper (Huber and Beardsley, 2000a). Distributional, and, occasionally, descriptive notes are given for all of the species treated. All are believed to be accidentally or, in a few cases, in disturbed areas which contain mostly introduced plants. *Polynema* (not treated here) is the dominant mymarid genus in areas where native vegetation predominates, and is the only one which definitely includes endemic Hawaiian species.

Introduction

This paper is the first of a series that is planned to cover the taxonomy of Hawaiian Mymaridae. It is our intention that together these papers will constitute a taxonomic review of this family for the Hawaiian Islands, the first such review since the work of R.C.L. Perkins (1905, 1910). Since Perkins' time several species have been added to the known Hawaiian Mymaridae, but no attempt has been made to treat the entire fauna.

In this paper we provide a key to the genera of Mymaridae now known to occur in Hawaii, and treat the species in those genera which are represented in Hawaii by one, or a few, non-endemic species. The more speciose genera, *Anagrus* Haliday, *Gonatocerus* Nees, and *Polynema* Haliday, will be treated in separate papers.

Although all of the species that are reported here as new to the Hawaiian Islands are identified to genus, we are unable to determine the specific identities of several of them. For many mymarid genera the present state of knowledge is so incomplete that positive species identification is virtually impossible without reference to type material. Furthermore, it is often difficult to determine the origin of accidentally introduced species, although it appears that many of those reported here arrived from the Nearctic region. The species whose names are unknown are simply numbered, to avoid cluttering the literature with new names which might prove to be synonyms. Where tentative identifications have been made from literature, without reference to types or other authoritatively determined specimens, the

specific epithet is preceded by a question mark. Most of the specimens of the incompletely identified species that were examined are deposited in the BPBM and HDOA, but a few are in CNCI and UCRC.

The present whereabouts of the type material of five mymarid species described by R.C.L. Perkins in connection with his work on the biological control of the sugarcane planthopper, *Perkinsiella saccharicida* Kirkaldy (Perkins 1905) is presently unknown. These species, all of which have been reported to be present in the islands, are *Alaptus immaturus*, *Anagrus frequens*, *Leimacis peregrina*, *Paranagrus optabilis*, and *P. perforator*. Some of these can be recognized fairly confidently from their descriptions, but one of them, *L. peregrina* (now placed in *Arescon* Walker), apparently has never been recollected. In the absence of type material, this species is treated here as a nomen dubium, and should be excluded from the lists of Hawaiian insects until such time as the genus can be definitely confirmed to occur in the islands.

The types of other mymarid species described by Perkins (1905, 1910) are now in the Bishop Museum. The missing types should have been among those sent to the Bishop Museum in 1968, when the type collection of the Hawaiian Entomological Society, formerly housed at the Experiment Station of the Hawaiian Sugar Planters' Association in Honolulu, was given to the Museum. Perhaps the missing types were sent out on loan prior to that time, but no record of such a loan is known to exist.

Exploration of the Hawaiian mymarid fauna is still incomplete. Most of the material examined was collected within the last three decades. During that period, but especially since the mid-1980s, a variety of passive collection methods were used, including yellow pan traps, Malaise traps, and yellow sticky traps, in addition to the active method of sweeping with a fine-mesh insect net. While all such techniques result in many mymarids being collected, they should not entirely replace the collection of host eggs and the rearing of mymarids from these in the laboratory. Although tedious, this method provides the maximum amount of biological information on plant and insect host associations. Further exploration in more remote and inaccessible areas, using all of these methods, undoubtedly will yield more species and many new distribution records. Additional immigrant species certainly will continue to arrive in Hawaii from overseas. Therefore, although our papers will considerably increase knowledge of the Hawaiian mymarid fauna, they should not be considered to be complete. We hope that others will be encouraged to study this interesting family of egg parasitoids, and thus increase knowledge not only of their taxonomy, but especially of their biology, which remains virtually unknown for many of the species that occur in Hawaii. Huber's (1986) summary of the hosts of Mymaridae should be consulted for ideas as to the possible hosts of the Hawaiian species.

All but two of the Hawaiian mymarid genera treated here (*Chaetomymar* and the apparent new genus) are illustrated and keyed in Huber (1997).

Methods

Approximately 800 pinned and slide-mounted specimens were examined during this study. The material consisted partly of old, dirty or poorly mounted specimens collected during the early part of this century, as well as much material collected since the 1950's, particularly in the 1980's and 1990's, mainly by J. W. Beardsley, P. Follett, L. LeBeck, L. Masner, W. D. Perreira, G. K. Uchida and C. M. Yoshimoto. Much material was collected during recent general insect surveys (1994–98) by means of yellow sticky-board traps suspended in roadside trees. This collection method is abbreviated YSBT in the lists of material examined in this paper. The inclusive dates cited indicate the periods during which the traps were exposed.

The only other abbreviations used in this paper are the institutional abbreviations specified below, and F = funicular segment in females, or flagellar segment in males. All measurements were taken from slide-mounted specimens. The ovipositor length was measured in the fully retracted position, from tip to anterior end of basal curve. Ovipositor length is often given in comparison to that of the hind tibia.

Specimens examined during this study are deposited in the following institutions, listed below according to the abbreviations used in the text. The person presently in charge of each collection also is indicated.

BPBM - Department of Natural Sciences, Bernice P. Bishop Museum, Honolulu. G. Nishida.
CNCI - Canadian National Collection of Insects, Department of Agriculture and Agri-Food, Ottawa. J.T. Huber.

HDOA - Division of Plant Industry, Hawaii Department of Agriculture, Honolulu. B. Kumashiro.

UCRC - Department of Entomology, University of California, Riverside. S. Triapitsyn.

Only the locations of specimens that are deposited outside of Hawaii are given in the text. Specimens deposited in institutions in the islands will be at one or the other of the two listed for Honolulu.

The key to genera below includes all those that are known to occur in the islands, based on the specimens we have seen. Because no specimens of *Arescon peregrina* (Perkins) are known to exist, the genus *Arescon* is excluded from the key, but the species is discussed in the notes. As far as possible, features common to both sexes have been used in the key to avoid constructing separate keys to males and females. Mymarid sex ratio is slightly to highly female biased, with some species apparently thelytokous. Mymarid taxonomy therefore is largely based on female characters, at least at the species level. For this reason, characters restricted to the female sex have been used in most couplets of the key.

Key to Mymarid Genera Known from the Hawaiian Islands

- 1 Tarsi 5-segmented; female funicle 5-, 7-, or 8-segmented, when 7-segmented the second segment sometimes minute and ring-like (may be difficult to see) 2
- Tarsi 4-segmented; female funicle usually 6-segmented, 4-segmented in one minute species, 5-segmented in one species of *Erythmelus* 6

- 2(1) Body at least 0.7 mm long; forewing relatively broad, less than 5 times as long as wide, fringe setae much shorter than wing width; female funicle 8-segmented 3
- Body ca. 0.5 mm. long or less; forewing very narrow, more than 5 times as long as wide, fringe setae much longer than wing width; female funicle 5- or 7-segmented 4

- 3(2) Face with subantennal grooves extending from innermargin of torulus to mouth margin; propodeum at most with 2 rather faint submedian carinae; gastral petiole at most as long as wide *Gonatocerus*
- Face without subantennal grooves; propodeum with diamond-like pattern of distinct carinae; gastral petiole much longer than wide *Ooetonus*

- 4(2) Gaster broadly and smoothly joined to mesosoma, without apparent petiole; forewing not curved apically; female F2 not ring-like 5
- Gaster joined to mesosoma by short, slender petiole; forewing distinctly curved apically; female F2 minute, ring-like *Camptoptera*

- 5(4) Hind margin of forewing strongly notched at level of venation; female funicle 5-segmented, male antenna 10-segmented *Alaptus*
 - Hind margin of forewing not notched at level of venation; female funicle 7-segmented, male antenna 12-segmented *Dicopus*
- 6(1) Gastral petiole narrow and distinct, much longer than broad 7
 - Gastral petiole not apparent, gaster either broadly and smoothly joined to mesosoma, or petiole much broader than long 11
- 7(6) Forewing strongly petiolate, oar-like, apex broadened, with dark spot *Mymar*
 - Forewing not petiolate, if apex with dark spot, then usually at least one other dark area present 8
- 8(7) Face above toruli depressed between eyes; vertex with distinct depression to the side of each posterior ocellus and in front of anterior ocellus; inner surface of scape rasp-like *Stephanodes*
 - Face above toruli not depressed, in same plane as lower face; vertex flat, without depressions adjacent to ocelli; inner surface of scape not rasp-like, at most with fine oblique or transverse reticulation 9
- 9(8) Propodeum with a V-shaped pair of carinae meeting above gastral petiole insertion; forewing with some discal setae enlarged and blunt tipped, with 3 dark transverse bands *Acmopolynema*
 - Propodeum without carinae, or with a single median carina; forewing with discal setae unmodified, hyaline or, occasionally, with dark bands 10
- 10(9) Vertex with about 30 setae; axillar setae greatly lengthened, reaching apex of scutellum; forewing narrow, ca. 6 times as long as wide, with 2 brown bands, subbasal and apical; body, including antennae, yellowish to light brown, except dark brown female club and apical tarsal segments *Chaetomymar*
 - Vertex with fewer than about 15 setae; axillar setae normal, not reaching midpoint of scutellum; forewing variable, usually broader, if with brown bands, none at apex; body usually dark brown with uniformly dark antennae *Polynema*
- 11(6) Forewing with sides nearly parallel, hardly broader near apex than just beyond venation (9:8); female antenna short, the funicle segments as broad or broader than long *Cleruchus*
 - Forewing gradually and distinctly expanded apically, lateral margins clearly diverging; female antenna more elongate, at least some funicle segments longer than broad 12
- 12(11) Posterior scutellum longitudinally divided by broad furrow 13
 - Posterior scutellum entire 15
- 13(12) Forewing relatively narrow, the fringe setae longer than wing breadth; female club 1-segmented *Anagrus*
 - Forewing relatively broad, the fringe setae shorter than wing breadth; female club 2- or 3-segmented 14
- 14(13) Body uniformly yellow or almost black; mesothoracic phragma rounded apically;

- female club 3-segmented *Stethynium*
- Body brown, with base of gaster and antenna (except brown female club) pale yellow; mesothoracic phragma indented apically; female club 2-segmented
..... *Shizophragma*
- 15(12) Female funicle 4-segmented new genus
- Female funicle 5- or 6-segmented 16
- 16(15) Body dark brown; forewing evenly setose except 2 small asetose areas separated by a row of setae, beyond and behind venation; female club 2-segmented; gaster without distinct hypopygium enclosing ovipositor *Anaphes*
- Body light brown or yellow; forewing with a few distinct rows of setae, or almost bare; female club 1-segmented; gaster with distinct hypopygium enclosing ovipositor *Erythmelus*

Taxonomic Notes on Genera and Species

Acmopolynema Ogloblin

Most species of this genus occur in the New World, but several old world species are known. Others presently may be misplaced in *Polynema*.

Acmopolynema uma Schauff.

Acmopolynema uma Schauff 1981:451.

Acmopolynema bifasciatipennis, Asquith and Messing 1993:15, Nishida 1994:165 (misidentification of *A. uma* Schauff).

This is the only described New World species of *Acmopolynema* that has the distal band of the forewing extending to the wing apex. The forewing illustrations of three of Girault's Australian *Polynema* species (New 1976) also show a banded apex, and these species actually may belong in *Acmopolynema*. Several Hawaiian *Polynema* species also have banded forewings and superficially resemble *Acmopolynema*, but the wing apex of these is always hyaline. *Chaetomymar bagicha* (Narayanan, Subba Rao and Kaur) has a dark band at the apex of the forewing, but lacks the V-shaped propodeal carina and modified discal setae of the forewing which are found in *A. uma*.

Material examined. Kauai I.: Kokee, 13–17.X.1965, J.W. Beardsley (1 ♀); Moloa'a Bay, 2–21.II.1990, R. Messing and A. Asquith, fallow weeds (1 ♀). **Molokai I.:** near Honomuni Stream, 10 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (1 ♀). **Oahu I.:** Ewa, 10.VI, 4.VIII, 22.IX, and 27.X.1965, J.W. Beardsley (4 ♀); Honolulu, 1979, B. Kumashiro (1 ♀); Honolulu, Bishop Museum Grounds, 29.X.1963, C.M. Yoshimoto (1 ♀); Kahuku, 9.VI.1964, J.W. Beardsley (1 ♀); Mt. Kaala, 1200m, 18.VII.1968, C.M. Yoshimoto (1 ♀); Poamoho Trail, 5.X.1965, C.M. Yoshimoto (1 ♀); Waimanalo, 17.VIII.1965, J.W. Beardsley (1 ♀); Waimanalo Experiment Station, 21–28.VIII.1986, L. LeBeck (1 ♀)(CNCI).

Alaptus Westwood

The five-segmented female funicle, 10-segmented male antenna, and distinctly notched forewing will serve to distinguish species of *Alaptus* from similar very small mymarids, such as *Dicopus* spp.

Alaptus is represented in Hawaii by at least nine species. Only two named species, *A. globosicornis* Girault and *A. immaturus* Perkins, have been reported from Hawaii in literature. However, the original descriptions of both were based on non-Hawaiian specimens,

and, to our knowledge, Hawaiian specimens have never been compared directly with the holotypes of these. Therefore, these names are cited here preceded by a question mark. Two additional species are reported in literature as "*Alaptus* sp." (Swezey 1929, Timberlake 1924). We have examined the slide-mounted specimens on which these records are based. However, these are unclear, and we cannot be certain of their identity.

In the available Hawaiian *Alaptus* specimens (several hundred, including males) we observed differences in characters such as integumental sculpture, length of ovipositor, form of antennal scape, relative lengths of funicle and club segments, etc. These differences suggested that at least seven species, in addition to the two listed above, were represented in this material. For example, sp. 3 has clearly defined, strongly arcuate, striate sculpture on the mesoscutum, whereas other specimens show very weakly developed, nearly transverse striations on this sclerite, or none at all.

Time constraints, and the need for additional material from areas of Hawaii that are largely unrepresented in existing collections, have limited our study of Hawaiian *Alaptus*. A more thorough treatment should await the publication of revisionary studies on continental faunas of this poorly known group.

The species of *Alaptus* from Hawaii that are treated here probably are all accidental immigrants that originated elsewhere. All *Alaptus* species for which hosts are known develop as parasitoids in the eggs of Psocoptera, and most of the common Psocoptera now present in lowland areas of Hawaii are recent immigrants from other places (Thornton 1981, Zimmerman 1948a). There is an extensive endemic Psocoptera fauna in Hawaii, but the species are now largely confined to remaining areas of native vegetation, mostly at higher elevations, which have not been well sampled for the present study. Parasitoids which may be associated with endemic Psocoptera are completely unknown. Possibly, future research will discover endemic species of *Alaptus*, or other genera of Mymaridae, associated with eggs of endemic Hawaiian Psocoptera.

The key below is based on females. Males are more difficult to separate, and males of some species have not yet been recognized. Except where obvious structural characters exist (as in sp. 3), unassociated males have not been included in the listings of specimens. Additional study is needed before a satisfactory key to males can be developed.

Key to Known Hawaiian Species of *Alaptus*

(Females)

- | | | |
|------|--|---------------------------|
| 1 | Ovipositor relatively long, ca. 150μ or more, longer than hind tibia (5:4 or more) ... | 2 |
| - | Ovipositor shorter, ca. 100–130μ long, shorter than to slightly longer than hind tibia | 5 |
| 2(1) | Mesoscutum strongly striate, the striations looping anteriorly | sp. 3 |
| - | Mesoscutum very weakly, transversely striate, or smooth | 3 |
| 3(2) | Mesosoma and gaster largely pale, head pale with dark vertex | <i>?immaturus</i> Perkins |
| - | Body partly to entirely dark | 4 |
| 4(3) | Mesosoma relatively pale, head and gaster darker; antennal club more elongate (ca. 110–122μ) | sp. 7 |
| - | Body uniformly dark; antennal club shorter (ca. 70–80μ) | sp. 1 |

- 5(1) Scape short, triangular, slightly longer than and about as wide as pedicel sp. 5
 - Scape longer, usually smoothly curved, broadest at center, much longer than wide, narrower than pedicel 6
- 6(5) Second funicle segment about as long as wide or a trifle longer (5:4), two apical funicle segments globose ?*globosicornis* Girault
 - Second funicle segment ca. twice as long as wide or more, both apical funicle segments not globose 7
- 7(6) Antenna elongate, F1 ca. 3 times as long as wide or more sp. 4
 - Antenna shorter, F1 ca. twice as long as wide 8
- 8(7) Gaster uniformly dark; ovipositor usually a bit longer (ca. 125–130 μ); club a bit shorter (ca. 75–85 μ) sp. 2
 - Gaster paler basally, darker around ovipositor; ovipositor usually a bit shorter (ca. 100–120 μ); club a bit longer (ca. 88–100 μ) sp. 6

***Alaptus ?globosicornis* Girault.**

Alaptus globosicornis Girault 1908:15; 1913:10; Timberlake 1924:364; Swezey 1929:289; Zimmerman 1948a:227; Nishida 1992:176; 1994:165.

Alaptus globosicornis variety *hawaiiensis* Girault 1912b:124; Swezey 1929:289.

This species was first reported from the Hawaiian Islands by Girault (1912b), from a single specimen collected in Honolulu in 1900 on which he based his variety *hawaiiensis*. He gave the color of that variety as “deep reddish brown”, compared to grayish for the Australian form. The species was reported from the islands by Timberlake (1924) and Swezey (1929). Apparently, no one has reexamined Girault’s types to determine the taxonomic status of the subspecies, and it may be only a color variant. The species is cited here with a question mark as, to our knowledge, Hawaiian specimens have not been directly compared with type material. It probably occurs throughout the islands as its host is a common, widespread species associated with stored products, dead insects, etc.

Material examined. Hawaii I.: Kohala Mt. Road at mile post 10, el. ca. 3480 ft, W.D. Pereira, YSBT (1 ♀). **Maui I.:** Uku Mehana, 29.VIII.1929, O.H. Swezey, ex psocid egg?, pods of *Acacia farnesiana* (1 ♀). **Molokai I.:** Kalaniana’ole Colony, el. 3 ft, 8–22.xii.1995, W.D. Pereira, YSBT (1 ♀). **Oahu I.:** Diamond Head, 21.X.1916, P.H. Timberlake, reared from oleander material infested with coccids and psocids (1 ♀)(UCRC); Honolulu, 1.VIII.1912, ex psocid eggs (1 ♀, 1 ♂); 18.X.1912, ex psocid eggs (8 ♀); Honolulu, Kaimuki, 4.XII.?, ex psocid eggs (9 ♀, 5 ♂)(UCRC); Honolulu, 3.XI.1929, O.H. Swezey, ex psocid eggs (8 ♀); Honolulu, in quarantine house plant path, HSPA Expt. Stn., 13.X.1941, J.P. Martin (1 ♀); Honolulu, Makiki, 2.X.1983; M. Early, Berlese sample (1 ♀); Pearl Harbor, West Loch, el. 0–5 ft, W.D. Pereira, YSBT (1 ♀); Pearl Harbor, West Loch, el. 3 ft, 24.VI–4.VII.1998, W.D. Pereira, YSBT (1 ♀).

Host. *Liposcelis divinatorius* (Müller) (Psocoptera) (Timberlake 1924).

***Alaptus ?immaturus* Perkins.**

Alaptus immaturus Perkins 1905:197; 1910:661; Girault 1913:9; Swezey 1929:289; Timberlake 1924:447; Nishida 1992:176; 1994:165.

The pale color of this species is distinctive. However, until the type is found and Hawaiian specimens have been compared with it, we cannot confirm their identity.

Perkins (1910) first reported this species from the islands. It may have been accidentally

introduced from Australia in sugarcane planthopper parasite material (Timberlake 1924). This supposition was based on the label on a specimen reared in Honolulu in 1905 by F.W. Terry, but that specimen may have been of local origin, from our interpretation of the specimen label.

Material examined. Hawaii I.: Kauhiula at edge of Hilo Bay, el. 60–80 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (2 ♀); Manuka, along Hawaii Belt Road, near mile post 82, el. ca. 1700 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (1 ♀); Whittington Beach Park at Honu'apo Bay, el. 3 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (3 ♀). **Kauai I.:** Kokee, el. 3,000 ft, at mile marker no. 9, 25.X–15.XI.1994, G. Uchida and W.D. Perreira, YSBT (2 ♀). **Molokai I.:** Halawa Valley, el. 200 ft, IX.1994, W.D. Perreira, YSBT (1 ♀); V–VI.1995 (1 ♀); Honomuni Stream, el. 10 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (10 ♀, 1 ♂); 14–21.X.1994 (2 ♀); Mapulehu near Ililiopu Heiau, el. 10–40 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (1 ♀); 2–16.IX.1994 (1 ♀). **Oahu I.:** Ewa Plant. Co., 22.VIII.1905, ex material from 1st col'y placed there (3 ♀); Honolulu, 2.VI.1910, on hemipterous eggs (1 ♀); 28.XI.1915, on window (4 ♀); 1.28.1916, P. H. Timberlake, reared from psocid eggs under white cocoon on *Cassia* (12 ♀, 1 ♂)(UCRC); Honolulu, Expt. Stn. HSPA, F.X.W.(Williams), ex psocid eggs (10 ♀, 2 ♂); Honolulu, U.H. Campus, Manoa, 6.I.1982, D.J. Preston and R. Burkhart, ex *Morganella longispina* (2 ♀); Honolulu, 2065 Lanihuli Drive, 28.I–28.II.1986, L. LeBeck, pan trap in flowering weeds (1 ♀)(CNCI); Manoa Valley, near dumpster, 11–21.I.1985, L. LeBeck, pan trap (1 ♀) (CNCI); Oahu Sugar Co., ex material bred fr. (F no. 34), this material arrived from S. S. Moana 16.XI.04, fixed up at O.S.Co. 27.XI.04, col. 6.I.05, emerged 20.II.05, FWT(Terry) (1 ♀); Waimanalo, U. H. Farm, el. 60–80 ft, 5.VI.1995, J.W. Beardsley and W.D. Perreira, sweeping crops and weeds (1 ♀).

Host. Unidentified Psocoptera eggs. Swezey (1929) reared it from psocid eggs on foliage.

Alaptus sp. 1.

This is a robust, almost black species with a large ovipositor (200–260μ long). The body is around 0.48–0.5 mm long. This may be to be a new state record, or possibly is the same as the *Alaptus* sp. reported by Swezey (1929) on the basis of two males from Maui Island.

Material examined. Hawaii I.: Manuka, along Hawaii Belt Rd. near mile post 82, el. ca. 1700 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (1 ♀). **Kauai I.:** Kokee Rd., el. 3,000 ft at mile marker no. 9, 25.X–15.XI.1994, G.K. Uchida and W.D. Perreira, YSBT (3 ♀). **Maui I.** Hanawai Str., el. 1040 ft, 18.XI–2.XII.1995, W.D. Perreira, YSBT (1 ♀). **Molokai I.:** Halawa Valley, el. 200 ft, V–VI.1995, W.D. Perreira, YSBT (5 ♀); Palaau State Park, el. 1500 ft, IX.1994, W.D. Perreira, YSBT (4 ♀); 13–17.X.1995 (1 ♀). **Oahu I.:** Mt. Tantalus, 550m, 30.X.1963, C.M. Yoshimoto, Malaise trap (5 ♀); Tantalus Drive, el. 600 ft, 29.IV–12.V.1997, W.D. Perreira, YSBT (1 ♀); el. 1200 ft, 8–22.VII.1997 (1 ♀); 22.VII–5.VIII.1997 (6 ♀); 5–19.VIII.1997 (1 ♀); el. 1600 ft, 2–16.IX.1997 (1 ♀); Tantalus, Nahuina Trail, el. 1200 ft, 5–19.VIII.1997, (1 ♀); Puu Ualakaa (Round Top), el. ca. 900 ft, 6–21.XII.1996 (1 ♀); Round Top Drive, el. 900 ft, 15–25.IV.1997 (2 ♀); 29.IV–12.V.1997 (2 ♀); 12–27.V.1997 (2 ♀); 27.V–10.VI.1997 (1 ♀); 10–24.VI.1997 (1 ♀); 24.VI–8.VII.1997 (1 ♀); 22.VII–5.VIII.1997 (2 ♀).

Alaptus sp. 2.

Alaptus sp., Timberlake 1924:447(?); Swezey 1929:289(?).

This is probably the species first reported by Timberlake (1924), collected at Hakalau Plantation, Hawaii I. in 1914. These specimens were examined during this study. However, such old, uncleared specimens are difficult to compare in detail with more recently collected specimens which have been cleared in KOH prior to slide-mounting. It is a small (around 0.3 mm long), light brown species with pale appendages

Material examined. Hawaii I.: Hakalau Plantation, V.1914 (1 ♀) (UCRC); Whittington Beach Park at Honu'apo Bay, el. 3 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (1 ♀). **Molokai I.:** Halawa Valley, el. 200 ft, 29.IX–13.X.1995, W.D. Perreira, YSBT (1 ♀); 10–24.XI.1995 (1 ♀); 19.I–2.II.1996 (2 ♀); 2–16.II.1996 (3 ♀); 16.II–1.III.1996 (1 ♀); 15–29.III.1996 (1 ♀); 29.III.–12.IV.1996 (2 ♀); Honomuni Str., el. 10 ft, 12–26.IV.1996, W.D. Perreira, YSBT (1 ♀); Mapulehu, nr. Ililiopae Heiau, el. 10–40 ft, IX–X.1994, W.D. Perreira, YSBT (1 ♀); 10–24.V.1996 (1 ♀). **Oahu I.:** Camp Pupukea, el. 950 ft, 15–28.V.1996, W.D. Perreira, YSBT (5 ♀); Mt. Tantalus, 550m., 20.X.1965, C.M. Yoshimoto, Malaise trap (2 ♀); Round Top Drive, el. 900 ft, 22.VII–5.VIII.1997, W.D. Perreira, YSBT (1 ♀); 19.VIII–2.IX.1997 (1 ♀); 23.II–5.II.1998 (1 ♀); IV.1998 (1 ♀); Tantalus Drive, el. 1500 ft, 29.IV–12.V.1997; W.D. Perreira, YSBT (1 ♀); 22.VII–5.VIII.1997 (2 ♀).

Alaptus sp. 3.

This species, a new record for Hawaii, is similar in overall size (ca. 0.5 mm long), ovipositor size, and coloration to species 1, but the dorsum of the mesosoma is definitely striate, particularly the mesoscutum where the striations are strongly anteriorly arched, and the antennae are more elongate than in species 1.

Material examined. Hawaii I.: Manuka, along Hawaii Belt Rd., near mile post 82, el. ca. 1700 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (2 ♀, 2 ♂). **Oahu I.:** Lualualei, 14.II.1996, D. Preston, Malaise trap (1 ♂); Round Top Drive, el. 900 ft, 15–29.IV.1997, W.D. Perreira, YSBT (1 ♂); Tantalus Drive, el. 1600 ft, 19.VIII–2.IX.1997, W.D. Perreira, YSBT (1 ♀); Tantalus, Nahuina Trail, el. 1200 ft, 8–22.VII.1997, W.D. Perreira, YSBT (1 ♀, 1 ♂); 22.VII–5.VIII.1997 (1 ♀); Waimanalo, U.H. Farm, el. 60–80 ft, 20.II.1996, J.W. Beardsley and W.D. Perreira, sweeping weeds and crops (1 ♀).

Alaptus sp. 4.

This species was not recognized previously in Hawaii and at present is known from only two females. The ovipositor is about 110µ long and the antennal club is about 95–100µ long. The antennae, particularly the funicle segments, are distinctly elongate. F1 is ca. three times as long as wide and F3 is nearly 5 times as long as wide. The body is about 0.33 mm long.

Material examined. Hawaii I.: near Puu Anahiiui, mile post 18, Hawaii Belt Rd., el. ca. 2150 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (1 ♀); Whittington Beach Park at Honu'apo Bay, el. 3 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (1 ♀).

Alaptus sp. 5.

Females of this species can be recognized by the relatively short, broad, triangular form of the antennal scape. The ovipositor is of moderate length (ca. 125–140µ), and the ovipositor capsule appears to be slightly, angulately upturned at about the midlength. The antennal club is moderately short (ca. 70–75µ long). The body is light brown in color with relatively pale appendages, and is about 0.35 mm long. It is a new state record.

Material examined. Molokai I.: Mapulehu, nr. Ililiopae Heiau, el. 10–40 ft, 2–16.II.1996, W.D. Perreira, YSBT (3 ♀). **Oahu I.:** Coconut Grove, Kailua, el. 10 ft, 4–16.IV.1997, W.D. Perreira, YSBT (1 ♀); Pupukea Road, el. 120–250 ft, 24.VIII–7.IX.1997, W.D. Perreira, YSBT (1 ♀); West Loch, Pearl Harbor, el. 3 ft, 5–14.I.1998, W.D. Perreira, YSBT (2 ♀); 14–24.I.1998 (2 ♀); 1–11.II.1998 (2 ♀); 25.II–10.III.1998 (1 ♀); III–IV.1998 (1 ♀); 11–28.IV.1998 (4 ♀).

Alaptus sp. 6.

This species is quite similar to species 2 in size and form, but differs in having a noticeably bicolored gaster which is dark basally and paler apically, except for a dark area around the

ovipositor. The ovipositor averages a bit shorter than in species 2 (ca. 100–120 μ long) and the antennal club is a bit longer (ca. 88–100 μ). It appears to be a new state record for Hawaii.

Material examined. Molokai I.: Kalaniana'ole Colony, el. 3 ft, 7–21.VII.1995, W.D. Pereira, YSBT (5 ♀); 4–18.VIII.1995 (4 ♀); 24.XI–8.XII.1995 (3 ♀); 8–22.XII.1995 (1 ♀); 5–19.I.1996 (3 ♀); 16.II–1.III.1996 (1 ♀); 15–29.III.1996 (2 ♀); 12–26.IV.1996 (2 ♀); 27.X–10.XI.1996 (2 ♀); Kapukahehu Beach, el. 5 ft, XI–XII.1994, W.D. Pereira, YSBT (1 ♀); Kualapuu Coffee Fields, el. 750 ft, 29.IX–13.X.1995, W.D. Pereira, YSBT (1 ♀). **Oahu I.:** Barber's Point Lighthouse, el. 5 ft, 2–7.IV.1996, J.A. Furuyama and W.D. Pereira, YSBT (3 ♀); U. H. Farm at Waimanalo, el. 60–80 ft, 5.VI.1995, J.W. Beardsley and W.D. Pereira, sweeping crops and weeds (2 ♀); West Loch, Pearl Harbor, el. 3 ft, 15–29.XII.1997, W.D. Pereira, YSBT (1 ♀); 1–11.II.1998 (5 ♀); 11–25.II.1998 (1 ♀); 25.II–10.III.1998 (5 ♀); 10–23.III.1998 (2 ♀); 23.III–2.IV.1998 (1 ♀); 2–11.IV.1998 (3 ♀); 11–29.IV.1998 (1 ♀); 29.IV–6.V.1998 (2 ♀).

Alaptus sp. 7.

This species has a large elongate ovipositor (ca. 250–275 μ) and long antennal club (110–122 μ). It is distinctly paler than species 1, which it otherwise resembles, particularly the mesosoma which is paler than both the head and the gaster. The overall length is about 0.45 mm. This is a new state record.

Material examined. Hawaii I.: Kipalimehue, along Hawaii Belt Road nr. MP 92, el. ca 1600 ft, 20.X–3.XI.1995, W.D. Pereira, YSBT (1 ♀). **Oahu I.:** Round Top Drive, el. 900 ft, 24.VI–8.VII.1997, W.D. Pereira, YSBT (1 ♀); 22.VII–5.VIII.1997 (2 ♀); 2–16.IX.1997 (1 ♀).

Anagrus Haliday

Hawaiian representatives of this genus are treated in another paper in this series (Triapitsyn and Beardsley 2000). *Anagrus* is probably the best studied genus of Mymaridae in the islands, because of the importance of a few species in controlling major pests of sugarcane and maize (Perkins 1905, Swezey 1936, Triapitsyn and Beardsley 2000).

Anaphes Haliday

This genus is represented in Hawaii by one introduced species. This species has a two-segmented female antennal club, as in *Schizophragma*, and belongs to the *crassipennis* group (previously *Patasson* Walker) of *Anaphes* (Huber 1992). Beardsley (2000) reviewed the history of the importation and establishment of this species in the Hawaiian Islands. Males of this group cannot be identified with certainty, so records of males given below could be incorrect if more than one species of this group is present in Hawaii. However, we assume that they are *A. calendrae*, as this is the only species of the genus presently known to occur in the islands.

Anaphes calendrae (Gahan).

Anaphoidea calendrae Gahan 1927:32; Williams 1929a:227; 1929b:29; Satterthwait 1931:171.

Patasson calendrae, Beardsley 1964:360, Bianchi 1964:346; Davis and Krauss 1964:395; Davis 1968:16; Chong 1969:285; Davis and Chong 1969:320.

Anaphes calendrae, Huber 1992:73, Beardsley 2000.

Material examined. Hawaii I.: Kahua Ranch, 30.I.1968, F. Haramoto, col. by D-Vac (6♂); Hilo Coast, Kulekole Beach Park, 19.X.1983, D.M. LaSalle (1 ♀, 1♂) (CNCI). **Maui I.:** Haleakala Hwy., el. 90 ft, 18.XI–2.XII.1995, W.D. Pereira, YSBT (1♂). **Oahu I.:** Barbers Pt. el. 3–10 ft, 16.XI.1995, J.W. Beardsley and W.D. Pereira, general sweeping (1 ♀); Hickam A.F.B., 19.V.1988, J.W. Beardsley, sweeping (3♂); Honolulu, Bishop Museum

grounds, 29.X.1963, C.M. Yoshimoto, Malaise trap (1 ♀, 1 ♂); Honolulu, Hawaii Dept. of Agriculture insectary, lab reared, I.1968 (14 ♀, 6 ♂); Honolulu, 2065 Lanihuli Drive, 28.I–28.II.1985, L. LeBeck, pan trap in flowering weeds (1 ♀)(CNCI); Honolulu, University of Hawaii Campus, Gilmore Hall, 27.IV.1986, L. LeBeck, pan trap (1 ♀)(CNCI); Honolulu, U. H. Manoa Campus, 3.VI.1995, J.W. Beardsley, sweeping weeds and grass (1 ♀, 6 ♂); Mt. Tantalus, 550m, 30.X.1963, C.M. Yoshimoto, Malaise trap (2 ♀); Waimanalo at U. H. Farm, el. 60–80 ft, 20–23.II.1996, J.W. Beardsley and W.D. Perreira, yellow pitfall trap near eggplant (1 ♀).

Hosts. *Sphenophorus cariosus* (Olivier) and *S. venatus vestitus* Chittenden (Coleoptera: Curculionidae)(Beardsley 2000). Bianchi (1964) reported rearing this mymarid on eggs of *Rhabdoscelus obscurus* (Boisduval) in the laboratory, but that host has not been confirmed in the field.

Arescon Walker

Arescon is a widespread genus and has been recorded from Micronesia (Doutt 1955), so it is possible that it will eventually be found in Hawaii. The habitus illustration of the genus in Doutt (1955) should make it easily recognizable.

Arescon peregrina (Perkins), **nomen dubium.**

Leimacis peregrina Perkins 1910:661; Timberlake 1924:448; Swezey 1929:289.

Arescon peregrina, Nishida 1992:176; 1994:165.

Leimacis Förster was synonymized under *Arescon* by Kryger (1934). The combination *Arescon peregrina* (Perkins) was proposed by Nishida (1992) without an indication that it was new. The female type of this species, the only specimen mentioned by Perkins, is lost, and no other specimens are known to exist. We have searched without success for Hawaiian *Arescon* in all collections of Hawaiian Mymaridae that are known to us, but have found no representatives of that genus from the islands. Swezey (1910) recorded an “*Alaptus* (?) sp.” from the nest of a megachilid bee, possibly associated with psocids. The journal editor added a footnote “probably *Leimacis peregrina* Perkins.” The basis for the footnote is unknown, but Swezey did not alter his identification. Swezey (1929) referred only to the original description of *L. peregrina*, stating that its habits were unknown. Apparently, neither Swezey nor Timberlake (1924) ever saw specimens of *L. peregrina*. Therefore the species is treated here as a nomen dubium and is excluded from our key.

Camptoptera Förster

The narrow, curved forewing and petiolate gaster are characteristic of this genus. Three species, so far represented only by females, have been collected in the Hawaiian Islands. All are new records for the state, and are believed to be relatively recent immigrants. This genus was not mentioned by previous collectors such as Perkins and Swezey, although, because of their very small size, they may have been overlooked.

Key to Hawaiian Species of *Camptoptera*

- 1 F1 about half as long as pedicel, or less sp. 1
- F1 nearly as long as, or longer than pedicel 2
- 2(1) F1 distinctly longer than pedicel (17:13), outer portion not narrowed, antenna about as long as body sp. 2
- F1 slightly shorter than pedicel (9:11), outer third narrower than base, antenna shorter than body (3:4) sp. 3

Camptoptera sp. 1.

This is one of the smallest mymarids known from Hawaii, measuring 0.28–0.34 mm long.

Material examined. Hawaii I.: Manuka, along Hawaii Belt Rd., near mile post 82, el. ca. 1700 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (2 ♀). **Maui I.:** Honomanu Bay, el. 5 ft, 18.XI–2.XII.1995, W.D. Perreira, YSBT (1 ♀). **Midway Is.:** Sand I., Roosevelt and Halsey Drives, 1–17.V.1997, G.M. Nishida and G.A. Samuelson, Malaise (1 ♀). **Molokai I.:** Halawa Valley, el. 200 ft, XI.1994, W.D. Perreira, YSBT (1 ♀); V–VI.1995 (2 ♀); Mapulehu near Ililiopae Heiau, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (1 ♀); Papio Stream, el. 600 ft, 21.VII–4.VIII.1995, W.D. Perreira, YSBT (1 ♀). **Oahu I.:** Waimanalo at U. H. Farm, 5.VI.1995, J.W. Beardsley and W.D. Perreira, sweeping crops and weeds (15 ♀); 18–22.V.1996, W.D. Perreira, YSBT (4 ♀).

Camptoptera sp. 2.

This species is slightly larger than species 1, measuring 0.36–0.40 mm long.

Material examined. Molokai I.: Honamuni Stream, el. 10 ft, X.1994, W.D. Perreira, YSBT (1 ♀); Mapulehu near Ililiopae Heiau, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (1 ♀); Papio Stream, el. 600 ft, 21.VII–4.VIII.1995, W.D. Perreira, YSBT (1 ♀). **Oahu I.:** Waimanalo at U.H. Farm, el. 60–80 ft, 20–22.II.1996, J.W. Beardsley and W.D. Perreira, yellow pitfall trap near citrus (1 ♀).

Camptoptera sp. 3.

This species is represented by a single specimen, which is 0.4 mm long.

Material examined. Oahu I.: Campbell Industrial Park, el. 5–10 ft, 5–17.II.1997, J.W. Beardsley and W.D. Perreira, yellow pan trap (1 ♀).

Chaetomymar Ogloblin*Chaetomymar bagicha* (Narayanan, Subba Rao and Kaur).

Polynema bagicha Narayanan, Subba Rao and Kaur 1960:886.

Chaetomymar bagicha, Subba Rao 1989:154; Hayat 1992:85.

This species was accidentally introduced into the Hawaiian Islands from some part of the Oriental region, possibly India or southeast Asia, where it apparently is widespread. It is a new record for Hawaii. *C. bagicha* may have arrived at the same time as its host, *Sophonia rufofascia* (Kuoh and Kuoh) (Cicadellidae), which was first reported in Hawaii in 1987 (Heu and Kumashiro 1989). However, no specimens of this species were collected in Hawaii until June 1995, and, in view of the concentrated research effort on the ecology of this economically important leafhopper in Hawaii prior to the discovery of *C. bagicha* there, it seems likely that *C. bagicha* is a more recent arrival in the islands than its host.

Material examined. Hawaii I.: Kauhiula, at edge of Hilo Bay, el. 60–80 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (1 ♀). **Maui I.:** Haleakala Hwy., el. 90 ft, 18.XI–2.XII.1995, W.D. Perreira, YSBT (1 ♀). **Molokai I.:** Halawa Valley, el. 200 ft, 19.I–2.II.1996, W.D. Perreira, YSBT (4 ♀), 16.II–1.III.1996 (4 ♀), 1–15.III.1996 (1 ♀, 1 ♂); nr. Honomuni Stream, el. 10 ft, 5–19.I.1996, W.D. Perreira, YSBT (2 ♀), 29.III–12.IV.1996 (1 ♀); Mapulehu nr. Ililiopae Heiau, el. 10–40 ft, 19.I–2.II.1996, W.D. Perreira, YSBT (3 ♀), 12–26.IV.1996 (1 ♀). **Oahu I.:** Dillingham Field, el. 10 ft, 15–28.V.1996, W.D. Perreira, YSBT (2 ♀); Kuaokala Forest Reserve, el. 1,400–1,600 ft, 27.III–2.IV.1996, J.A. Furuyama and W.D. Perreira, YSBT (1 ♀); Lualualei Stream, 14.II.1996, D. Preston, Malaise trap (5 ♀); Maunawili Valley and Trail, X.1995 and 20.XII.1996, P. Follett, ex *Sophonia rufofascia* on *Cibotium splendens* (9 ♀, 1 ♂)(CNCI); Pupukea Rd., el. ca. 160 ft, 15–28.V.1996, W.D. Perreira, YSBT (1 ♀); U. H. Campus, Manoa, el. ca. 80 ft, 3.VI.1995, J.W. Beardsley, gen-

eral sweeping (1 ♀); Waimanalo at U. H. Farm, el. 60–80 ft, 5.VI.1995 and 20.II.1996, J.W. Beardsley and W.D. Perreira, sweeping (3 ♀); 15–22.V.1996, W.D. Perreira, YSBT (2 ♀).

***Cleruchus* Enock**

Members of this genus have nearly parallel-sided forewings, and moderately short antenna in females. The face, in lateral view, has a distinct medial bulge, so that the antennal toruli appear to arise from a shelf. The only known Hawaiian representative has the funicle segments as broad or broader than long; the antennae are somewhat more elongate in some extralimital species (Debauche 1948).

***Cleruchus* sp.**

The single complete female, and a second headless female, of an unidentified species of *Cleruchus* that are available for study probably represent a recently established immigrant species that eventually will be found to be more widespread in the islands. Its origin is unknown.

Material examined. Molokai I.: Mapulehu nr. Ililiopae Heiau, el. 10–40 ft, 13–27.X.1995, W.D. Perreira, YSBT (1 headless ♀); 26.IV–10.V.1996, W.D. Perreira, YSBT (1 ♀).

***Dicopus* Enock**

Members of this genus have the metasoma broadly joined to the mesosoma. This feature, and their small size, make them superficially similar to species of *Alaptus*. The number of funicular segments (7 in females, 10 in males) and lack of a distinctly notched forewing will distinguish *Dicopus* species from those of *Alaptus*. The genus is in need of revision, and the specific identity of the Hawaiian species is still in question.

***Dicopus ?psyche* Girault.**

Dicopus psyche Girault 1912a:22.

Seven slide-mounted specimens, five females and two males, have been examined. These appear to represent a single species of *Dicopus*, which may be *D. psyche*. Girault described that species based on a unique male from Fiji, and his description of the wing fits that of the Hawaiian specimens very well. However, we cannot be certain of the determination until Hawaiian specimens have been directly compared with the holotype.

This is the first published record of *Dicopus* from Hawaii, although the oldest of these specimens was collected in 1915.

Material examined. Maui I.: Haleakala, 2700m., 28.I.1964, D.M. Tsuda, ground litter (1 ♀); near Wailena Gulch, el. ca. 600 ft, 23.VIII–6.IX.1996, W.D. Perreira, YSBT (1♂). **Oahu I.:** Honolulu, 28.XI.1915, on window (1 ♀)(UCRC); Honolulu, 9.I.1919, ex psocid (1♂); Honolulu, 25.III.1924, P.H. Timberlake, in ent lab on desk (1 ♀)(UCRC); N. side Kalihi Valley, 1500 ft, 7.VI.1967, J.R. Vockeroth, dead bracket fungus (1 ♀); Mt. Kaala, 4,000 ft, 18–26.V.1991, W.D. Perreira, in pitfall (1 ♀).

***Erythmelus* Enock**

This genus is represented in Hawaii by four species, all of which appear to be accidental immigrants and are new records for the state. A male that apparently belongs with females of one of the three unidentified species is the only male of this genus from Hawaii that we have seen.

Key to Hawaiian Species of *Erythmelus*

(Females)

- 1 Funicle 5-segmented (subgenus *Parallelaptera*) *funiculi* (Annecke and Doutt)
 - Funicle 6-segmented (subgenus *Erythmelus*) 2
- 2(1) Antenna and mesoscutum uniformly dark; legs partly dark; basal third of gaster pale; ovipositor ca. twice as long as hind tibia sp. 1
 - Antenna pale basally, gradually darkening toward apex; mesoscutum with a narrow submedian transverse pale stripe, or a broad pale stripe covering posterior half; legs mostly pale; basal half of gaster pale; ovipositor less than twice as long as hind tibia 3
- 3(2) Mesoscutum with broad pale stripe covering posterior half; ovipositor 1.6–1.8 times as long as hind tibia sp. 2
 - Mesoscutum with a relatively narrow submedian transverse pale stripe; ovipositor 1.2–1.3 times as long as hind tibia sp. 3

Erythmelus (Parallelaptera) funiculi (Annecke and Doutt).

Parallelaptera funiculi Annecke and Doutt 1961:44.

Erythmelus funiculi, Trjapitzin 1993:268.

Trjapitzin (1993) provided a key to the species of the subgenus *Parallelaptera*, which he treated as the *panis* group of *Erythmelus*. The single Hawaiian species of this subgenus was well described and illustrated by Annecke and Doutt (1961). It is about 0.5 mm long, with the ovipositor slightly longer than the hind tibia (6:5). Color is brownish with pale legs; antenna with scape and pedicel pale, outer segments darker.

Specimens were identified by Dr. S. Triapitsyn, University of California, Riverside.

E. funiculi was known previously only from South Africa (type locality) and Uganda. It is believed to be a recent accidental introduction into Hawaii as it was not found there prior to May 1995. The host is presently unknown.

Material examined. Molokai I.: Mapulehu near Iliiopae Heiau, el. 10–40 ft, V.1995, W.D. Perreira, YSBT (5 ♀). **Oahu I.:** Dillingham Field, el. 10 ft, 15–28.V.1996, W.D. Perreira, YSBT (1 ♀); Lualualei, along Hakimo Rd., el. ca. 100 ft, 27.III–2.IV.1996, J.A. Furuyama and W.D. Perreira, YSBT (1 ♀); 2–7.IV.1996, W.D. Perreira (8 ♀); Pupukea Rd., el. ca. 160 ft, W.D. Perreira, YSBT (6 ♀); Waimanalo at U. H. Farm, el. 60–80 ft, 5.VI.1995, J.W. Beardsley and W.D. Perreira, sweeping crops and weeds (8 ♀); 15–22.V.1996, W.D. Perreira, YSBT (11 ♀); Yokohama Bay, el. ca. 5 ft, 27.III–2.IV.1996, J.A. Furuyama and W.D. Perreira, YSBT (1 ♀); 2–7.VI.1996 (1 ♀).

Erythmelus sp. 1.

This species averages slightly larger than species 2 and species 3, ranging mostly between 0.8 and 0.9 mm long. It is uniformly dark with a narrower pale basal band on the gaster than in either species 2 or species 3. The antenna and mesoscutum are entirely dark, and the legs are mostly dark except for pale tarsi, foretibia and basal half of hind tibia.

The existence of two slides of this species from Honolulu, 1916, ex corn, indicates that it has been present in Hawaii for many years, although not previously reported.

Material examined. Hawaii I.: Manuka, along Hawaii Belt Rd., near mile post 82, el. ca. 1700 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (2 ♀). **Kauai I.:** Kalaheo Gulch, el. 550 ft, 15–22.XI.1994, W.D. Perreira and G.K. Uchida, YSBT (2 ♀). **Maui I.:** Honomanu Bay, el. 5 ft, 18.XI–2.XII.1995, W.D. Perreira, YSBT (1 ♀). **Molokai I.:** Halawa Valley, el. 200

ft, 11–25.XI.1994, W.D. Perreira, YSBT (2 ♀, 1 ♂); 21.VII–4.VIII.1995 (6 ♀); Honomuni Stream, el. 10 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (2 ♀); Kamalo Bridge, el. 3 ft, IX.1994, W.D. Perreira, YSBT (1 ♀); Kualapuu, in coffee field, el. 750 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (8 ♀); 2–16.IX.1994 (2 ♀); Mapulehu near Ililiopae Heiau, el. 10–40 ft, 21.VII–4.VIII.1995, W.D. Perreira, YSBT (1 ♀); 4–18.VIII.1995 (1 ♀); Palaa State Park, el. 1500 ft, IX.1994, W.D. Perreira, YSBT (1 ♀); Papio Stream, el. 600 ft, 21.VII–4.VIII.1995, W.D. Perreira, YSBT (1 ♀). **Oahu I.:** Honolulu, 1916, ex corn (4 ♀); Waimanalo at U. H. Farm, el. 60–80 ft, 20.II.1996, J.W. Beardsley and W.D. Perreira, sweeping weeds and crops (1 ♀).

Erythmelus sp. 2.

This species averages slightly smaller than species 1, ranging mostly between 0.6 and 0.8 mm long. It differs from that species in having a broad pale stripe across the posterior half of the mesoscutum, a black dot surrounded by pale areas on each axilla, a broader pale stripe on the gaster, and paler appendages. It is about the same size as species 3 (see below), but the mesoscutum of that species lacks the broad pale stripe covering the posterior half. Species 3 also has a distinctly shorter ovipositor.

Although this species apparently is now quite common in the islands, the first specimen was not collected until May 1988, on Oahu.

Material examined. Hawaii I.: Kauhiula, at edge of Hilo Bay, el. 60–80 ft, 20.X.–3.XI.1995, W.D. Perreira, YSBT (1 ♀); Whittington Beach Park at Honu'apo Bay, el. 3 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (2 ♀). **Kauai I.:** Kalaheo Gulch, el. 550 ft, 15–22.XI.1994, W.D. Perreira and G.K. Uchida, YSBT (4 ♀). **Molokai I.** Kalaniana'ole Colony, el. 3 ft, 7–21.VII.1995, W.D. Perreira, YSBT (2 ♀); Kamilo Bridge, el. 3 ft, V–VI.1995, W.D. Perreira, YSBT (1 ♀); Kapukahehu Beach, el. 5 ft, VI.1994, W.D. Perreira, YSBT (1 ♀); V–VI.1995 (1 ♀); Kualapuu, in coffee field, el. 750 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (9 ♀); 16–30.IX.1994 (4 ♀); V–VI.1995 (3 ♀); Mapulehu near Ililiopae Heiau, el. 10–40 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (1 ♀); 16–30.IX.1994 (3 ♀); 21.VII–4.VIII.1995 (1 ♀); 27.X–10.XI.1995 (1 ♂); Palaa State Park, el. 1500 ft, IX.1994, W.D. Perreira, YSBT (1 ♀). **Oahu I.:** Hickam A.F.B., 19.V.1988, J.W. Beardsley, sweeping (1 ♀); Honolulu, Lyon Arboretum, 19–21.V.1989, L. Masner (1 ♀)(CNCI); Waimanalo at U.H. Farm, 5.VI.1995, J.W. Beardsley and W.D. Perreira, sweeping weeds and crops (4 ♀).

Erythmelus sp. 3.

This species is similar in size and general appearance to species 2, but is easily separated by the characters given in the key. So far, species 3 has been found only on Oahu and Molokai, where it has been collected at a few localities near the seashore. Like species 2, it was first collected during May 1988.

Material examined. Molokai I.: Mapulehu nr. Ililiopae Heiau, el. 10–40 ft, W.D. Perreira, YSBT (1 ♀). **Oahu I.:** Barbers Point nr. the lighthouse, el. 5 ft, 29.I–11.II.1995, W.D. Perreira and T. Mitomi, YSBT (4 ♀), and 2–7.IV.1996, W.D. Perreira and J.A. Furuyama, YSBT (4 ♀); Campbell Industrial Park, el. 5–10 ft, 5–17.II.1997, J.W. Beardsley and W.D. Perreira, yellow pan traps (10 ♀); Dillingham Field, el. 10 ft, 15–28.V.1996, W.D. Perreira, YSBT (2 ♀); Hickam AFB, 19.V.1988, J.W. Beardsley (1 ♀).

Gonatocerus Nees

This genus contains about a dozen species in Hawaii, all apparently accidentally or purposely introduced. It is treated in detail in a separate paper (Huber and Beardsley 2000b).

***Mymar* Curtis**

This distinctive genus is represented in the Hawaiian Islands by a single, rarely collected species. Interestingly, unlike most other introduced mymarid species, it has been taken only at relatively high elevation localities (around 2,000–4,000 ft) in areas of predominantly native vegetation.

Annecke (1961) reviewed the genus *Mymar* worldwide.

***Mymar taprobanicum* Ward.**

Mymar taprobanicum Ward 1875:197, Annecke 1961:547.

Female specimens agree well with Annecke's redescription; he did not treat the male. Although first collected in Hawaii in 1966, the species has not been previously reported from the state.

The type locality of *M. taprobanicum* is Ceylon, but Annecke (1961) records it also from South Africa, Egypt, Australia and Puerto Rico. Doutt (1955) recorded this species from Micronesia, and it may be widespread in the Pacific Islands.

Material examined. Hawaii I: Hawaii Volcanoes National Park, upper bird sanctuary, 20.XI.1989, J.C. Allen (1 ♀)(CNCI); Volcano, 775m, ohia forest, 19.IV.1992, N.L. Evenhuis, yellow pan (1 ♂). **Kauai I:** Kokee, 13–17.IX.1966, J.W. Beardsley (1 ♀).

***Ooetonus* Haliday**

The diamond-shaped pattern on the propodeum and the relatively elongate petiole distinguish this genus from *Gonatocerus*, the only other genus in which the females have an 8-segmented funicle. A single unidentified species presently is known in Hawaii from two specimens.

***Ooetonus* sp.**

Material examined. Hawaii I: Ahumoa Crater, 6,000 ft, 21.VI.1966, C.M. Yoshimoto (1 ♀); Mauna Loa Strip Rd., 24.VI.1966, J.W. Beardsley (1 ♀) (No altitude is indicated on the specimen label, but it must have been between 4,000 and 6,600 ft, which is the altitudinal range of the road).

***Polynema* Haliday**

This is the largest genus of Hawaiian Mymaridae. It includes 13 named species, all presumably endemic, that were described in the Fauna Hawaiiensis (one by Ashmead 1901, 12 by Perkins 1910), and one probably endemic species described by Girault (1913). Also, there are around 20 or more undescribed and presumably endemic species in existing collections, and at least three relatively recent immigrants, one of which has not yet been identified. The Hawaiian representatives of *Polynema* will be treated in detail in another paper.

***Schizophragma* Ogloblin**

Species of this genus resemble *Anaphes* in having a two-segmented antennal club in females, but they differ in having the posterior scutellum longitudinally divided, and the basal half of the gaster yellowish, instead of dark brown or black (Huber 1987). One accidental immigrant species is known from the islands.

***Schizophragma bicolor* (Dozier).**

Anaphes bicolor Dozier 1932:88.

Stethynium annulatum Doutt 1947:152.

Schizophragma bicolor, Huber 1987:834.

Huber (1987) redescribed this species in detail. The color is generally dark brown with

the basal half of the gaster pale. In the female the legs and antenna, except club, are mostly pale; the club is distinctly darker. The ovipositor extends to near the base of the gaster, and is ca. twice as long as hind tibia. The male is similar to the female, but has 13-segmented filiform antennae. Specimens are 0.7 to 0.8 mm long.

Outside of Hawaii, *S. bicolor* is known from North America, Central America and the Caribbean islands. Huber (1987) was first to record the species from Hawaii. He listed records from Oahu for specimens collected in October 1963 and September 1965; these are the earliest known records of *S. bicolor* in Hawaii.

Material examined. Hawaii I.: Manuka, along Hawaii Belt Rd., near mile post 82, el. ca. 1700 ft, 20.X–3.XI.1995, W. D. Perreira, YSBT (1 ♀); Whittington Beach Park at Hono'apo Bay, el. 3 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (18 ♀). **Kauai I.:** Kokee Road at mile post 9, el. ca. 3,000 ft, 25.X–15.XI.1994, G.K. Uchida and W.D. Perreira, YSBT (2 ♀). **Maui I.:** Honomanu Bay el. 5 ft, 18.XI–2.XII.1995, W.D. Perreira, YSBT (2 ♀). **Molokai I.:** Halawa Valley, el. 200 ft, VI.1994, J.W. Beardsley and W.D. Perreira, YSBT (1 ♀); 2–16.IX.1994, W.D. Perreira (6 ♀); V–VI.1995, W.D. Perreira, YSBT (2 ♀); 16.II–1.III.1996, W.D. Perreira, YSBT (1 ♂); Honomuni Stream, el. 10 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (3 ♀); 21.VI–4.VIII.1994 (4 ♀); X.1994 (1 ♀); Kamilo Bridge, el. 3 ft, X.1994, W.D. Perreira, YSBT (1 ♀); V–VI.1995 (1 ♀); 21.VII–4.VIII.1995 (1 ♀); Kapukahehu Beach, el. 5 ft, XI.1994, W.D. Perreira; YSBT (1 ♀); Kualapuu, in coffee field, 750 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (2 ♀); Mapulehu near Ililiopae Heiau, el. 10–40 ft, 19.VIII–2.IX.1994, W.D. Perreira; YSBT (1 ♀); V–VI.1995 (1 ♀); 9.VI.1995, sweeping (1 ♀); Palaau State Park, el. 1500 ft, X.1994, W.D. Perreira, YSBT (1 ♀). **Oahu I.:** Honolulu, Bishop Museum grounds, 29.X.1963, C.M. Yoshimoto, Malaise trap (1 ♀); Honolulu, University of Hawaii Campus, 28.IX.1965, J.W. Beardsley (6 ♀); 15.IV.1991, on *Sonchus oleraceus* (2 ♀); Lualualei Gulch, just N of Kolekole Pass, 470m, 27.XII.1995, G.M. Nishida, sweeping *Dodonea* (1 ♂); Mt. Tantalus, el. 550m, 30.X.1963, C.M. Yoshimoto, Malaise trap (2 ♀).

Stephanodes Enock

The conspicuous depressions on the vertex near each ocellus, together with the strongly imbricate scape distinguishes this genus from *Polynema*, which lacks these characters.

Stephanodes is widely distributed on Pacific islands. The genus was reviewed recently by Huber and Fidalgo (1997). These authors designated a lectotype and paralectotypes for the species treated below.

Stephanodes reduvioli (Perkins).

Polynema reduvioli Perkins 1905:196; 1910:667; 1913:198; Girault 1913:12; Swezey 1914:7; 1929:291; 1932:5; 1933:273; 1936:89; Timberlake 1924:449; 1926:43; Williams 1931:102; Zimmerman 1948b:149; Suehiro 1960:298; Butler and Usinger 1963:17; Beardsley 1966:183.

Stephanodes reduvioli, Huber and Fidalgo 1997:41.

Stephanodes similis, Nishida 1992:176; 1994:166 (misidentification).

Nishida (1992; 1994) cited *S. similis* from various islands of Hawaii, although that species was not previously reported from the state. Unless *S. reduvioli* is formally placed as a junior synonym of *S. similis*, this name should not be used in reference to Hawaiian specimens.

Specimens from Kure Island identified as “sp. nr. *similis*” by R. L. Doutt (Butler and Usinger 1963) appear to be identical to specimens from various Hawaiian localities, including Kure, determined by Beardsley and others as *Polynema reduvioli*.

Material examined. Hawaii I.: Ahumoa Crater, el. 6,800 ft, 21.VI.1966, C.M. Yoshimoto (1 ♀); Kilauea, Hilina Pali, 27.VIII.1905, O.H. Swezey, on grass (1 ♂); Kilauea, Kau, el.

4,000 ft, 22.VI.1966, J.W. Beardsley (4 ♀, 3 ♂); rim of Kilauea Iki Crater, el. 3,800 ft, VI.23.1966, C.M. Yoshimoto (1 ♂); Kipuka Puaulu, el. 3,800 ft, 24.VI.1966, C.M. Yoshimoto (2 ♀); Mauna Loa Strip Road, el. 6,600 ft, 24.VI.1966, J.W. Beardsley (1 ♀); Mt. Hualalai, 28.VI.1966, C.M. Yoshimoto (1 ♀). **Kauai I.:** Alakai Swamp, el. 220m, 14.IX.1965, C.M. Yoshimoto (2 ♀, 3 ♂); Alakai, Kokee, el. 4,000 ft, 22–24.VII.1968, D. Tsuda, Malaise trap (1 ♀, 2 ♂); Kokee, 4–5.VIII.1961, Maa, Miyatake and Yoshimoto (8 ♀, 7 ♂); 11–16.IX.1965, C.M. Yoshimoto (13 ♀, 5 ♂); 13.IX.1965, J.W. Beardsley (7 ♀, 1 ♂); 16.IX.1965, J.W. Beardsley (2 ♀, 4 ♂); Kokee, Alakai Swamp Trail, 15.X.1965, J.W. Beardsley (1 ♀); Moloa'a, 19.IX.1990, P. Britt, ex corn control plot (1 ♀); Moloa'a Bay, arthropod survey, 2–21.II.1990, R. Messing and A. Asquith (1 ♀); Makaweli, XI.1905, P. (=Perkins?), and 7.XI.1905 (1 ♀, 1 ♂). **Kure I.:** IX.1961, G.D. Butler (det. as sp. near *S. similis* (Foerster) by R.L. Doutt, 1962)(2 ♀); 14.IX.1964, J.W. Beardsley (1 ♀). **Laysan I.:** 16–21.VI.1962, J.W. Beardsley (3 ♀, 1 ♂). **Maui I.:** Haleakala, Halemau Trail, 7.VIII.1968, C.M. Yoshimoto, on Raillardia (1 ♂); Haleakala Crater, Paliku, el. 5,500 ft, 22.VII.1965, J.W. Beardsley (1 ♂); Honakawai Stream, el. 3,000 ft, 26.VIII.1965, J.W. Beardsley (1 ♀); Kula, X.1983, M. Johnson, on bean leaves (6 ♀, 1 ♂); IV–VI.1988, J.W. Beardsley, yellow pan trap (1 ♀). **Midway Is.:** Sand I., Roosevelt and Halsey Drives, 1–17.V.1997, G.M. Nishida and G.A. Samuelson, Malaise trap (2 ♀). **Molokai I.:** Ft. Molokai (no date), D.T. Fullaway (2 ♀); Halawa Valley, el. 200 ft, 16–30.IX.1994, W.D. Perreira, YSBT (1 ♀); Kaunakakai, 6.VI.1932, O.H. Swezey, ex *Reduviolus* eggs in *Chaetochloa*, and ex *Chaetochloa* (3 ♀, 1 ♂); Kawela, 26.IV.1929, O.H. Swezey, on manienie (1 ♀); Mapulehu, 20.III.1931, O.H. Swezey, Bermuda grass (1 ♀); Palaaau State Park, el. ca. 1,700 ft, VI.1994, J.W. Beardsley and W.D. Perreira (1 ♀); (no locality or date), J. Conradt, sweetpotato (2 ♀, 1 ♂). **Oahu I.:** Barbers Pt., 26.VI.1966, J.W. Beardsley (2 ♀); Ewa, 14.III.1961, alfalfa field (4 ♀); 28.3.1961 (3 ♀); 12.III.1964 (1 ♀); 30.VI.1965 (1 ♀); 9.II.1966 (1 ♀); Honolulu, (no date)(1 ♀); 29.V.1907 (1 ♀); 27.III.1917 (1 ♀); 24.VIII.1925; (1 ♀); Honolulu, Fort Shafter, 22.I.1934, C.T. Schmidt, ex green onions, probably from eggs of *Reduviolus capsiformis* (1 ♀); Hickam A.F.B., 19.V.1988, J.W. Beardsley, sweeping (2 ♀, 1 ♂); Honolulu, Baker St., 1904, R.C.L. Perkins (1 ♀, 1 ♂); Honolulu, 28.III.1916, J.C. Bridwell (4 ♀, 1 ♂); 15, and 19.IV.1957, J.W. Beardsley (2 ♀, 1 ♂); 1–25.V.1985, L. LeBeck (1 ♀)(CNCI); Kaimuki, (no date), 3.IV.1914 and 11.IV.1924, O.H. Swezey, ex grass (3 ♀, 3 ♂); Naval Airport near gate 1, 23.VII.1945, O.H. Swezey, ex *Chloris* grass (1 ♀, 1 ♂); ex eggs of *Reduviolus capsiformis* in *Chloris* grass (1 ♀, 1 ♂); U.H. Manoa, el. ca. 80 ft, 3.VI.1995, J.W. Beardsley, general sweeping (2 ♂); Waianae, 13.XII.1931, O.H. Swezey, on taro, and ex egg on taro (1 ♀, 1 ♂); Waimanalo, VII.1962, M. Tamashiro, parasite of *Nabis* eggs (3 ♀, 1 ♂); 12.I.1966, J.W. Beardsley, (1 ♀); 2.VII.1988, sweeping (1 ♀); 6.IX.1988, sweeping (3 ♀); Waimanalo, HITAHHR Experiment Station, 4.VI.1991, J.W. Beardsley, sweeping weeds and low bushes (3 ♀); Waimanalo, U. H. Farm, 18.VII.1994, J.W. Beardsley and W.D. Perreira, sweeping weeds and crops (1 ♀, 1 ♂); 3.VI.1995, J.W. Beardsley, general sweeping (1 ♂); el. 60–80 ft, 5.VI.1995, J.W. Beardsley and W.D. Perreira, sweeping weeds and crops (7 ♀, 6 ♂); Waipio, 16.V.1961, J.W. Beardsley, sweeping grass (1 ♀); Waipio Peninsula, 27.X.1965, J.W. Beardsley (1 ♀); 4.V.1966 (4 ♀).

Host. Reared from eggs of *Nabis capsiformis* (Germar) (Nabidae) (Perkins 1913; Swezey 1929). Perkins (1905) listed it as reared from eggs of *Nabis blackburni* White (as *Reduviolus*), but this record needs to be reconfirmed. Swezey (1929) stated that it was reared from eggs of *N. capsiformis* in 1905, with no mention of *N. blackburni*. *N. capsiformis* is widespread in the Pacific region, and *S. reduvii* has been found in association with that host outside of Hawaii (Huber and Fidalgo 1997).

***Stethynium* Enock**

This is the only mymarid genus present in Hawaii in which the females have a 3-segmented club. Two apparently accidental immigrant species, both previously unreported from Hawaii, are recorded here; one of them on the basis of a single male.

***Stethynium triclavatum* Enock.**

Stethynium triclavatum Enock 1909:452; Huber 1987:829.

Stethynium empoascae Subba Rao 1966:189; Huber 1987:829.

This species is generally yellowish in color, in contrast to the uniformly almost black male specimen that appears to represent a second Hawaiian species. The forewing of Hawaiian specimens is ca. 4 to 4.5 times as long as its maximum width, with a somewhat pointed apex. The ovipositor is moderately large, extending anteriorly to near the base of the gaster, and is somewhat less than twice as long as the hind tibia (110:65). The body length is ca. 0.7 mm.

This species is known from Europe, India and North America (Huber 1987). Apparently, it is a recent accidental introduction as it was not collected in Hawaii prior to 1994.

Host. Hawaiian hosts are unknown as it has not yet been reared there. *S. triclavatum* has been recorded elsewhere as a parasite of cicadellid eggs (Huber 1987). In India *S. empoascae* reportedly was reared from eggs of *Empoasca* (Subba Rao 1966), and *Empoasca* leafhoppers are likely hosts in Hawaii.

Material examined. Hawaii I.: Kauhiula, at edge of Hilo Bay, el. 60–80 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (1 ♀); Manuka, along Hawaii Belt Rd., el. ca. 1700 ft, 20.X–3.XI.1995, W.D. Perreira, YSBT (1 ♀). **Kauai I.:** Kalaheo Gulch, el. 550 ft, 15–22.IX.1994, W.D. Perreira and G.K. Uchida, YSBT (1 ♀); Kokee Road at mile marker 9, el. 3,000 ft, 25.X–15.XI.1994, G.K. Uchida and W.D. Perreira, YSBT (1 ♀). **Maui I.:** Honomanu Bay, el. 5 ft, 15.XI–2.XII.1995, W.D. Perreira, YSBT (1 ♀). **Molokai I.:** Halawa Valley, el. 200 ft, 2–16.IX.1994, W.D. Perreira, YSBT (3 ♀); 11–25.XI.1994 (3 ♀); V–VI.1995 (3 ♀); Honomuni Stream, el. 10 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (6 ♀); X.1994 (3 ♀); 21.VII–4.VIII.1995 (4 ♀); Kualapuu, in coffee field, el. 750 ft, 19.VIII–2.IX.1994, W.D. Perreira, YSBT (5 ♀); 30.IX–14.X.1994 (4 ♀); 8–22.XII.1995, W.D. Perreira, YSBT (1 ♂); Mapulehu, near Ililiopae Heiau, el. 10–40 ft, IX.1994, W.D. Perreira, YSBT (1 ♀); V.1995 (1 ♀); 21.VII–4.VIII.1994 (2 ♀); 4–18.VIII.1995 (1 ♀); Papio Stream, el. 600 ft, 2–16.IX.1994, W.D. Perreira, YSBT (1 ♀). **Oahu I.:** Waimanalo at U. H. Farm, el. 60–80 ft, 5.VI.1995, J.W. Beardsley and W.D. Perreira, sweeping crops and weeds (1 ♀).

***Stethynium* sp. 1.**

Until females of this species are collected we can do no more than to record its presence.

Material examined. Hawaii I.: Hawaii Volcanoes Nat. Park, (no date, presumably IV.1996), Myrica faya insect survey # 0118 (1 ♂).

New Genus

Six female specimens from two islands (Hawaii and Molokai) of a minute mymarid (ca. 0.2 mm long) apparently represent an undescribed genus and species. These are being described in a separate paper (Huber and Beardsley, 2000a). The characters given in the key to genera will serve to separate it from other known Hawaiian mymarids.

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